REMARKS

Office Action Dated February 1, 2005

Claims 1-3 were originally presented. The examiner rejected claims 1-3 based upon double patenting and on the grounds that the claims 1-3 claimed the same invention set forth in prior U.S. Patent No. 6,622,233 from which this patent application claims priority. Applicant has canceled claims 1-3 and has added new claims 4-13. Therefore, claims 4-13 are currently pending in the application.

Applicant respectfully submits that new claims 4-13 are distinct from canceled claims 1-3.

Discussion of Fractal-like Organization of the Embodiment of the Present Invention

There has been a need for improvements in the interplay between reconfigurable processing elements and reconfigurable communications resources. See patent specification at page 8, lines 3-12. An embodiment of the present invention meets that need through a computer system, with a fractal-like organization. A fractal has been characterized as a geometrical figure that consists of an identical motif repeating itself on an ever-reducing scale. See, for example, discussion in the specification at page 7, line 22 to page 8, line 2. The use of a fractal-like organization in a computer system permits the scaling of processing resources in proportion to scaling of communication resources, thereby alleviating some of the communications bottleneck problems that can occur in other computer organizations when processing resources.

For example, Figure 21 illustrates a "motif" involving the organization of ("first") subsystems 114-1 to 114-4. Note the symmetry about processing elements 166-9, 168-9, 170-9 and 172-9.

Figures 22 and 23 illustrate the same "motif" on a larger scale involving a similar organization of larger ("second") subsystems (164, 114-9, 178) and (192, 186, 194) and (164, 188, 194) and (178, 190, 192). Note the symmetry about "first" subsystems 114-9, 186, 188 and 190.

Figure 18 again illustrates the same "motif" on a still larger scale involving a similar organization of a still larger ("third") subsystem that comprises two second subsystems (164, 114-9, 178) and (192, 186, 194) inter-connected by two first subsystems (188, 190). Note the symmetry about a pair of "first" subsystems 188, 190.

Roughly speaking, the fractal-like "motif" that recurs at different scales in the "first", "second" and "third" subsystems of the disclosed embodiment involves a communications unit symmetrically disposed between two processing units. In Figure 21, a communication unit 166-9 is disposed between processing units 116-1 and 118-1, for example. In Figure 22, a communication unit 114-9 is disposed between two processing units 164 and 178, for example. In Figure 18, a communication unit 188 plus 190 is disposed between two processing units (164, 114-9, 178) and (192, 186, 194).

It should be appreciated that in the preferred embodiment disclosed in the patent specification, there is not a sharp demarcation between which processing elements or subsystems ought to be used for computation and which ought to be used for communication. However, the above paragraph reveals that there is a "motif" that recurs at different scales.

Applicant believes that this fractal-like organization can be especially beneficial when scaling computer system resources to more powerfully compute certain algorithms. For example, one of the "first" subsystems of Figure 21 could be programmed to process a sum-of-products algorithm such as a matrix multiply, FIR filter or FFT. Alternatively, a larger scale version of the "motif", with substantially the same proportion of processing and communications resources such as one of the "second" subsystems of figures 22-23 could be programmed to process the same algorithm just as efficiently since processing and communication resources scale substantially proportionately. As yet another even more powerful alternative, a still larger scale version of the

"motif", such the "third" subsystem of Figures 18 could be programmed to process the same algorithm just as efficiently since processing and communication resources again scale substantially proportionately.

Support for New Claims

Applicant respectfully supports that the new claims are fully supported by the specification and drawings as originally filed and do not constitute new matter. In order to facilitate the examiner's understanding that the new claims meet the written description requirement and find support in the specification, applicant has submitted below copies of the new claims annotated with reference numerals indicating correspondence between claim language and subject matter disclosed in the application as originally filed.

The inclusion of reference numerals is not intended to infer that the claims are limited only to the disclosed embodiment. Rather, as explained above, the reference numerals are included to show compliance with the written description requirement and support for the claim language.

Finally, applicant respectfully submits that these new claims do not constitute a "narrowing amendment". Rather, they constitute a wholly new set of claims that aim to encompass different inventive aspects of the embodiment disclosed in the patent specification.

Support for Claim 4

4. A computer system comprising:

a plurality of first subsystems (114-1 to 114-9 in Figures 13-17); and

a second subsystem (Figure 17);

wherein each first subsystem (e.g., 114-1) includes multiple processing elements (100-1 to 100-9 and 148) intra-connected (via A1, A2, B1-B8) to permit communication within such first subsystem among the processing elements;

wherein each first subsystem (e.g., 114-1) includes at least one processing element (148) that is coupled as a respective communication and processing unit for such respective first subsystem which permits communication among the multiple processing elements (100-1 to 100-9 and 148) of such first subsystem and processing elements of another first subsystem (e.g., 114-9) coupled to serve as a communication and processing unit for the second subsystem; and

wherein the second subsystem (Figure 17) includes the plurality of first subsystems (114-1 to 114-9); and

wherein multiple processing elements (182-1 to 182-9) of the another first subsystem (114-9) that is coupled to serve as a communication and processing unit for such second subsystem are coupled to permit communication among the at least one processing elements (166-9, 168-9, 170-9, 172-9, 174-9, 176-9, 178-9 and 180-9) of the multiple respective first subsystems (114-1 to 114-4 and 114-5 to 114-8) that are coupled to serve as communication and processing units for their respective first subsystems.

Support for Claim 5

5. The computer system of claim 4,

wherein there is a first proportionality (10:1) between a number of processing elements in each of the multiple first subsystems to a number of processing elements in the first subsystems that are coupled to serve as a communication and processing units; and

wherein there is a second proportionality (9:1) between a number of first subsystems in the second subsystem and a number of first subsystems that are coupled to serve as a communication and processing units; and

wherein the first proportionality substantially equals the second proportionality.

Support for Claim 6

6 The computer system of claim 4,

first (Figure 18 – 164, 178, 114-9) and second (Figure 18 – 192, 194, 186) second subsystems; and

a third subsystem (Figure 18);

wherein the third subsystem includes the first and second second subsystems (([164, 178, 114-9]), [192, 194, 186]) and at least two additional first subsystems (188, 190) that are coupled to serve as communication and processing units for such third subsystem; and

wherein multiple respective processing elements ([Figure 19/188 - 188-11 to 188-18 and 188-3], [Figure 20/190 - 190-11 to 190-18 and 190-3]) of the at least two additional first subsystems (188, 190) are coupled to permit communication among multiple respective at least one processing elements ([Figure 19/188 - 166-9, 168-9, 170-9, 172-9, 214-1, 214-2, 214-3 and 214-4], [Figure 20/190 – 174-9, 176-9, 178-9, 180-9, 222-1,222-2, 222-3, and 222-4]) of multiple respective first subsystems of the first and second second subsystems that are coupled to serve as communication and processing units for their respective first subsystems.

Support for Claim 7

7. The computer system of claim 4,

wherein there is a first proportionality (10:1) between a number of processing elements in each of the multiple first subsystems to a number of processing elements in the first subsystems that are coupled to serve as a communication and processing units; and

wherein there is a second proportionality (9:1) between a number of first subsystems in the second subsystem and a number of first subsystems that are coupled to serve as a communication and processing units;

wherein there is a third proportionality (9:1) between a number of first subsystems in the third subsystem and a number of first subsystems that are coupled to serve as communication and processing units; and

wherein the first, second and third proportionalities are substantially equal to each other.

Support for Claim 10

10. A computer system comprising:

a plurality of first subsystems (e.g., Figures 13-15/114);

wherein each of the plurality of first subsystems (e.g., 114- to 114-9) includes multiple processing elements (100-1 to 100-9 and 148) intra-connected to permit communication among the respective processing elements within such at least one network of processing elements; and further including,

first(164, 178, 114-9), second (192, 194, 186), third (164, 194, 188) and fourth (178, 192, 190) blocks of first subsystems (Figures 17-23);

wherein the first subsystems of the first block are intra-connected to permit intra-communication among the first subsystems within the first block;

wherein the first subsystems of the second block are intra-connected to permit intra-communication among the first subsystems within the second block;

wherein the first subsystems of the third block are intra-connected to permit intra-communication among the first subsystems within the third block; and

wherein the first subsystems of the fourth block are intra-connected to permit intra-communication among the first subsystems within the fourth block; and further including,

a **first first** subsystem (114-9) that is coupled to serve as a communication and processing unit for inter-communication between respective first subsystems of the **first block** (164) and respective first subsystems of the **second block** (178);

a **second first** subsystem (188) that is coupled to serve as a communication and processing unit for inter-communication between respective first subsystems of the **first block** (164) and respective first subsystems of the **third block** (194);

a **third first** subsystem (190) that is coupled to serve as a communication and processing unit for inter-communication between respective first subsystems of the **second block** (178) and respective first subsystems of the **third block** (192); and

a **fourth first** subsystem (186) that is coupled to serve as a communication and processing unit for inter-communication between respective first subsystems of the **third block** (192) and respective first subsystems of the **fourth block** (194).

Support for Claim 11

11. The computer system of claim 10,

wherein at least one processing element (148) of each of multiple respective first subsystems (114-1 to 114-4) of the **first block** (164) is coupled to serve as a communication and processing unit for its respective first subsystem so as to permit communication among the multiple processing elements of its respective first subsystem and processing elements of the **first first** (114-9) subsystem that is coupled to serve as a communication and processing unit for inter-communication between respective first subsystems of the first block (164) and respective subsystems of the second block (178) (Figure 22);

wherein at least one processing element (148) of each of multiple respective first subsystems (114-5 to 114-8) of the **second block** (178) is coupled to serve as a communication and processing unit for its respective first subsystem so as to permit communication among the multiple

processing elements of its respective first subsystem and processing elements of the **first first** (114-9) subsystem that is coupled to serve as a communication and processing unit for inter-communication between respective first subsystems of the first block (164) and respective subsystems of the second block (178) (Figure 22);

wherein at least one processing element (148) of each of multiple respective first subsystems (216-1 to 216-4) of the third block (192) is coupled to serve as a communication and processing unit for its respective first subsystem so as to permit communication among the multiple processing elements of its respective first subsystem and processing elements of the **second first** subsystem (186) that is coupled to serve as a communication and processing unit for inter-communication between respective first subsystems of the third block (192) and respective subsystems of the fourth block (194) (Figure 22);

wherein at least one processing element (148) of each of multiple respective first subsystems (208-1 to 208-4) of the fourth block (194) is coupled to serve as a communication and processing unit for its respective first subsystem so as to permit communication among the multiple processing elements of its respective first subsystem and processing elements of the **second first** subsystem (186) that is coupled to serve as a communication and processing unit for inter-communication between respective first subsystems of the third block (192) and respective subsystems of the fourth block (194) (Figure 22);

wherein at least one processing element (148) of each of multiple respective first subsystems (114-1 to 114-4) of the **first block** (164) is coupled to serve as a communication and processing unit for its respective first subsystem so as to permit communication among the multiple processing elements of its respective first subsystem and processing elements of the **third first** subsystem (188) that is coupled to serve as a communication and processing unit for inter-communication between respective first subsystems of the first block (164) and respective subsystems of the fourth block (194) (Figure 23);

wherein at least one processing element (148) of each of multiple respective first subsystems (208-1 to 208-4) of the **fourth block** (194) is coupled to serve as a communication and processing unit for its respective first subsystem so as to permit communication among the multiple processing elements of its respective first subsystem and processing elements of the **third first** subsystem (188) that is coupled to serve as a communication and processing unit for inter-communication between respective first subsystems of the first block (164) and respective subsystems of the fourth block (194) (Figure 23);

wherein at least one processing element (148) of each of multiple respective first subsystems (114-5 to 114-8) of the **second block** (178) is coupled to serve as a communication and processing unit for its respective first subsystem so as to permit communication among the multiple processing elements of its respective first subsystem and processing elements of the **fourth first** subsystem (190) that is coupled to serve as a communication and processing unit for inter-communication between respective first subsystems of the second block (178) and respective subsystems of the third block (192) (Figure 23); and

wherein at least one processing element (148) of each of multiple respective first subsystems (216-1 to 216-4) of the third block (192) is coupled to serve as a communication and processing unit for its respective first subsystem so as to permit communication among the multiple processing elements of its respective first subsystem and processing elements of the **fourth first** subsystem (190) that is coupled to serve as a communication and processing unit for inter-communication between respective first subsystems of the second block (178) and respective subsystems of the third block (192). (Figure 23)

CONCLUSION

In view of the above, each of the currently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue. If it is determined that a telephone conference would expedite the prosecution of this application, the Examiner is invited to telephone the undersigned at the number given below.

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In the event the U.S. Patent and Trademark office determines that an extension and/or other relief is required, applicant petitions for any required relief including extensions of time and authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to Deposit Account No. 03-1952 referencing Docket No. 404332000101. However, the Commissioner is not authorized to charge the cost of the issue fee to the Deposit Account.

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Respectfully submitted,

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